

What is claimed:

1. A titanium alloy with extra-low modulus and superelasticity, characterized in that the metallic alloy comprises 20~35 wt % niobium, 2~15 wt % zirconium, balanced titanium and other unavoidable impurity elements.
2. The titanium alloy of claim 1, characterized in that wherein the niobium and zirconium can be 30~45 wt % in total.
3. The titanium alloy of claim 1 or 2, characterized in that wherein the alloy may further comprise at least one component of 0.1~12 wt % selected from tin or aluminum in total.
4. The titanium alloy of claim 3, characterized in that wherein the zirconium and tin can be 3~20 wt % in total.
5. The titanium alloy of claim 1, 2, 3 or 4, characterized in that wherein the alloy may further comprise at least one interstitial element without toxicity selected from C or N or O with amount of less than 0.5 wt %.
6. A method of fabricating the titanium alloy with super-low modulus and superelasticity, including melting in vacuum and heat treatment, characterized in that wherein the heat treatment steps, solution treatment is at a temperature from 200 °C to 900 °C for from 10s to 2 h, followed by air cooling for from 2s to 60s and then water quenching or air cooling only.
7. The method of claim 6, characterized in that wherein after solid solution treatment and water quenching, the ageing is at a temperature of 200 °C~ 600 °C for 10s~60 min followed by air cooling for 2s ~ 60s and then water quenching.
8. A method of fabricating the titanium alloy with extra-low modulus and superelasticity, including melting in vacuum and heat treatment, characterized in that wherein the heat treatment steps, the ageing is at a temperature of 200 °C~600 °C for 2 min ~ 48h by air cooling.
9. A processing method of titanium alloy with the super-low modulus and superelasticity, including hot processing and cold processing, characterized in that wherein the cold processing steps consist of: cold rolling, cold drawing, cold forging or cold swaging, the deformation of cold processing is less than 20%.
10. A processing method of titanium alloy with the super-low modulus and superelasticity, including hot processing and cold processing, characterized in that wherein the cold processing steps consist of cold rolling, cold drawing, cold forging or cold swaging, nano-size material can be achieved when the deformation ratio of cold processing is higher than 50%.
11. The method of claim 10, characterized in that wherein the nano-size alloy is solid solution treated at a temperature from 500 °C to 850 °C for 10 s ~ 2h followed by water quenching.
12. The method of claim 10, characterized in that wherein super-high strength material can be achieved after ageing at temperature from 300 °C to 500 °C for 10m~10h.
13. The method of claim 10, characterized in that wherein the nano-size materials are solid solution treated at a temperature from 500 °C to 850 °C for 10s ~ 2h and then ageing at temperature from 300 °C to 550 °C for 10m~10h.